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ART. XXIII.—*Mineral Resources of Southern India. No. 5.*
Manganese Mines in the Kupput-gode Range, Southern Mah-
ratta Country. By LIEUT. NEWBOLD, F.R.S., &c. *Madras*
Army.

(Read June 4th, 1842.)

AT the time of my visiting these hills I had not seen Dr. Wilson's remarks on the minerals sent to the museum at Bombay by Trimulrow, from whose oral account of his excursion, and what he had heard among the hills, I was induced to imagine that there might be some truth in the report of the existence of coal. Led by this hope I proceeded from the gold-washings at Doni, and crossed the southern chain of the divergence by a steep and rugged mountain-path leading down on the opposite side by a ravine, in which the Kupput Iswara temple sits enshrined, into a jungly valley. A mile or two easterly down the valley, the village of Chick Wodurti is reached; here I was shown some fragments of a yellowish and brownish ferro-siliceous stone, not unlike some varieties of jasper, or the eisenkiesel of the Germans. The excavations whence these were procured were made by order of Hyder and Tippoo, who used these stones as gun-flints. They lie in the plain at the base of a spur of the Kupput-gode range, about two miles to the S.E. of Wodurti. They are evidently fragments of a large vein, analogous to those of chert or hornstone that so frequently occur near plutonic formations.

About the same distance from Wodurti, in the opposite or Doni chain of hills, the site of the so-called "charcoal-stone" (*Kolsá ka patthar*) mines was pointed out to me. After about an hour's walk through low jungle and stony broken ground, the native guides led me to the southern flank of the chain, which we ascended by a sort of break or cross valley that intersected the general line of direction nearly at right angles. On arriving at about the centre of the chain, the rocks on either side of the defile began to assume a darker and more rugged aspect, resembling somewhat the cuboidal masses of blackened laterite on the Western Ghauts, particularly on the rocky ascent on the left side of the defile. At the base of some of the blackest masses, the guides pointed out partially obliterated excavations which the old inhabitants of the village stated to me had been made by the agents of Hyder and Tippoo. On examination, I found the rock to consist

almost entirely of an iron-black substance, tough and powdery under the hammer, and some parts when struck emitted a sulphureous odour. It contains numerous veins and nests of a shining foliated mineral, of an iron-grey colour: some of the hollows are partially filled with a white powder,—probably decomposed felspar,—and others with small stalactites and botryoidal incrustations of the iron-black mineral. All of the surrounding masses which I examined (some of them cannot contain less than twenty cubic feet) are composed of this mineral more or less blended with siliceous and argillaceous matter: but it is, according to the information of the natives, confined to this particular locality. The sequestered situation, embosomed in the midst of a mountainous chain, covered with jungle and brushwood, and at a distance from any frequented track, would have secured it, one would have imagined, from the inquisitive eye of man; and its discovery attests strongly the active and intelligent spirit of research that guided the agents of the Mohammedan Mysorean princes to a spot that appears to have escaped both the active researches of a Christie, and the laborious investigation of the official statistical reporter, Dr. Marshall. It is not in this secluded spot alone that I have traced the efforts of Hyder and Tippoo to bring to light the mineral resources of the countries conquered by their arms, but in almost every province of the peninsula that I have traversed. The diamond mines of Cuddapah, the copper mines of Nellore, the heights of the Copper Mountain near Bellary, the lead mines near Jungumrazpilly, and other parts of the Nalla Malla chain, the gold mines and corundum pits of Mysore, the gold mines of Malabar and Wynad, the flint excavations near Rayel-cherrú in the Gooty district, and those between Cuddapah and Sidhout, and iron mines in all parts,—all bear evidence of the great importance they attached to the subject, though engaged in perpetual and harassing wars. Tippoo was a great encourager of the arts; and it is said that no less than forty-five books on various sciences were compiled and translated under his personal supervision; some were even translated from the French and English. In Major Stewart's catalogue of his library, we find the *Khawás al Hajar*, (خواص الحجارة) and the *Jawáhir Namah*, (جواهر نامه) two treatises on mineralogy, and particularly on gems, metals, and substances found in mines.

It is possible that the report of a "charcoal-stone" existing here led the agents of Hyder and Tippoo into this secluded spot as well as myself; and their disappointment must have been nearly as great, as they were entirely ignorant of the nature and use of the

black-looking mineral they discovered in its stead. Having contented themselves with making a few excavations, they returned to Seringapatam, and the mines have remained neglected to the present time.

The formation of the adjacent hills is mica, hornblende, and a chloritic schist, passing, in their upper portions, into siliceous and ferruginous schists and a lateritic rock. The specimens of the mineral I carried away proved to be oxide of manganese, associated with iron ore. I was unable to detect the existence of plumbago by exposure to a deflagrating heat with nitrate of potash. It fuses partially at the edges before the blowpipe, *per se*, with slight gaseous extrication, leaving a shining bluish-black slag. In the yellow flame it gives out a slight sulphurous odour, and the slag is affected by the magnet. With borax on charcoal it fuses with effervescence into an amethystine glass; with carbonate of soda on platina foil, into a light bluish-green glass. When powdered and treated with muriatic acid, the extrication of the peculiar fumes of chlorine sufficiently attests the presence of manganese. Fracture, dark-gray, earthy—streak, the same—soils the fingers; exterior surface rugged—often rust-coloured.

Sir Whitelaw Ainslie (Mat. Med., vol. i., p. 538) states his opinion that manganese is not common in India, and that Captain Arthur informed him that he had found it in Mysore, massive, in an indurated reddish-brown ochre, combined with oxide of iron. Since his time, however, it has been found by Colonel Cullen and Dr. Benza in the Nilgherries, in the iron ore near the lake at Ootacamund, and in the Kaití valley. Geognostic position, the quartz and ferruginous beds in hornblende rock, and sienitic granite.

Among some minerals sent by Major Burney from Ava to the Museum of the Asiatic Society of Bengal, and analysed by James Prinsep, the Secretary, we find one of the black oxide of manganese. It occurs also associated with iron ore in the Himalayas; and I have discovered it in veins in the laterite and sandstone rocks of the Southern Mahratta country, and the Nizam's territories, and in the metamorphic schists in the Ceded Districts. It is probably diffused in combination with iron ore to a considerable extent, both geographical and geological, in the rocks of India.
